

HELMINTH PARASITES OF CATS AND DOGS FROM CENTRAL UTAH¹

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ABSTRACT.— A survey of the helminth parasites of 100 stray cats and 50 dogs was conducted. Each host was euthanized, and the internal organs were excised and examined for parasites. Helminths identified from cats included the tapeworms *Dipylidium caninum* and *Hydatigera taeniaformis*, and the nematodes *Physaloptera* sp. and *Toxocara mystax*. Two species of coccidia, *Isospora felis* and *I. rivolta*, and one ectoparasitic mite, *Cheyletiella parasitivorax*, were also recovered from cats during sugar flotation of the feces. Helminths identified from dogs included the tapeworms *D. caninum*, *Taenia hydatigena*, *T. krabbei*, and *T. pisiformis*, and the nematodes *Filaroides milksi*, *Toxascaris leonina*, and *Toxocara canis*. Of those parasites collected, *D. caninum*, *T. canis*, and *T. mystax* are known to cause accidental infection in humans and could represent potential health hazards in this region.

In recent years, several parasites of cats and dogs have been shown to cause disease in man. Most notably, *Toxoplasma gondii*, *Echinococcus* sp., *Multiceps* sp., *Dipylidium caninum*, *Toxocara* sp., *Ancylostoma* sp., and *Dirofilaria immitis* have all been found to occasionally parasitize humans. Therefore, further knowledge regarding the incidence of these parasites within a community has both veterinary and public health significance.

Although several surveys of the parasites of domestic cats and dogs have been conducted throughout the United States (Levine 1968, 1973), no survey has been reported on the parasites of cats in Utah. The only reported survey for the helminth parasites of dogs in Utah was by Butler and Grundman (1951); however, their study involved examination of feces only. The current survey was conducted to identify the helminth parasites found at necropsy in cats and dogs from Utah County in central Utah.

MATERIALS AND METHODS

Cats and dogs examined in this study were obtained through the animal control facilities in Provo, Orem, and American Fork, Utah. The animals were euthanized with an intracardiac injection of sodium pentobarbital at the recommended dosage level (1 ml/2 kg body wt). The entire alimentary tract, gall bladder, bile duct, liver, heart, pulmonary artery, respiratory and excretory systems were excised and examined for helminth para-

sites. Blood samples were also taken from the hearts of cats shortly after death. Smears were subsequently stained with Geimsa and examined microscopically for microfilariae and other blood parasites. The first 30 dogs were also examined for microfilariae using the technique described by Knott (1939). The possibility of infections with *Trichinella spiralis* was ascertained by pressing a 2-cm square sample of diaphragm muscle between two ¼" plexiglass slides and then examining the tissue under the dissecting microscope for encysted larvae. Fecal samples were also routinely collected from cats and examined using sugar flotation for coccidia and helminth eggs. Any oocysts found were mixed with 2.5 percent potassium dichromate and allowed to sporulate at room temperature for five to seven days in order to facilitate identification of the oocysts.

RESULTS

CATS: Postmortem examinations of 100 cats from Provo and American Fork, Utah, revealed that 53 harbored at least one species of parasite. The following four genera and four species of helminths were identified: *Dipylidium caninum* (1 percent of cats infected), *Hydatigera taeniaformis* (10 percent), *Physaloptera* sp. (2 percent), and *Toxocara mystax* (43 percent).

Two species of coccidia were also recovered during sugar flotation of feces—*Isospora felis* in six cats, and *Isospora ri-*

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volta in four. In addition, one ectoparasitic mite, *Cheyletiella parasitivorax*, was detected in the feces of four cats.

Dogs: Of 50 dogs examined from Provo and Orem, Utah, 31 were infected with at least one species of helminth. The following five genera and seven species of parasites were identified: *Dipylidium caninum* (2 percent of dogs infected), *Taenia hydatigena* (4 percent), *Taenia krabbei* (26 percent), *Taenia pisiformis* (4 percent), *Filaroides milksi* (2 percent), *Toxascaris leonina* (6 percent), and *Toxocara canis* (26 percent).

DISCUSSION

This study demonstrated that 53 percent of cats and 62 percent of dogs surveyed from central Utah harbored parasites of at least one species. The most frequently encountered parasite was *Toxocara* sp., the common ascarid of cats and dogs. These hosts become infected by ingesting infective ova from the ground or other surfaces contaminated with cat or dog feces, or by eating rodents which contain infective second-stage larvae in their tissues (Soulsby 1968). In an extensive survey of parasites of rodents in Utah, Grundmann (1976) identified ascarid larvae only in the desert woodrat, *Neotoma lepida*. Thus, this intermediate host may be an important source of infection to feral cats or stray dogs in this region.

Humans may become infected with the larval stages of *Toxocara* sp. by accidentally ingesting the ova passed from infected carnivores. Beaver et al. (1952) concluded that such infections in humans, termed visceral larva migrans, were usually caused by the larvae of *Toxocara canis* from dogs; however, *T. mystax* from cats has also been implicated (Swartzwelder 1941). Symptoms in humans include hyperglobulinemia and a pneumonia-like condition (Haddow and Gall 1970), hypereosinophilia (Lee and Danaraj 1972), hepatomegaly, fever, cough, anorexia, irritability, and nervous disorders (Beaver 1958). The high prevalence of this nematode in the current survey suggests that a potential threat to human health exists in these communities and that further education concerning this parasite is warranted.

Toxascaris leonina, another intestinal ascarid, was collected from three of 50

dogs, but from none of the cats examined in this study. This worm does not follow the typical migratory route through the lungs, and therefore is relatively non-pathogenic to its host. Butler and Grundmann (1951) found a lower incidence of this helminth (3.5 percent) in their survey from fecal samples only; however, single adult males were found in the current project that would have gone unnoticed in their survey.

Physaloptera sp., a stomach worm of carnivores, was collected from two of 100 cats. Generally, these nematodes are firmly attached to the stomach mucosal lining on which they feed, but, on occasion, they change their site of attachment, leaving numerous lesions that might continue to bleed (Soulsby 1968). This parasite has been reported from cats in Hawaii (Ash 1962), Michigan, New York, Illinois, Louisiana, and Ohio (Levine 1968), but no *Physaloptera* sp. has been previously reported in Utah. Even though the past history of stray cats examined in this study is unknown, it is presumed that *Physaloptera* sp. is a valid parasite of cats in this region.

Filaroides milksi, a nematode sometimes found in the lungs of canids, was collected in this study from the left ventricle of a young spaniel. This dog was born in central Utah and had never left prior to being released to the animal control facility by its owner. The life cycle of *F. milksi* is unknown, but a terrestrial gastropod is assumed to be the intermediate host (Levine 1968). This is the first reported incidence of this parasite in Utah.

No *Trichinella* larvae were found in either the dogs or cats examined in this survey, nor were any larvae detected by Grundmann (1976) in his survey of parasites of rodents in Utah. Also, no hookworms were recovered from cats or dogs examined in this study, although Butler and Grundmann (1951) found eggs of *Ancylostoma* sp. in the feces of 11 percent of 200 dogs examined from Salt Lake Valley.

The double-pored tapeworm of dogs, *Dipylidium caninum*, was found in one cat and one dog surveyed. This is the first reported infection of cats in Utah, and only the second reported infection of dogs from this region. Butler and Grundmann (1951) first observed one of 200

dogs examined from central Utah to be parasitized by *D. caninum*. The cysticeroid larvae of this cestode develop in the flea, *Ctenocephalides* sp., and the mallophagan louse, *Trichodectes* sp. These intermediate hosts must be ingested by the cat or dog for infection of the definitive host to occur. Although documentation is lacking, it appears that fleas and lice are not common ectoparasites of cats and dogs in Utah or other arid regions. This would then account for the low incidence of tapeworms that use these arthropods as intermediate hosts. *Dipylidium caninum* has also been reported to occasionally parasitize man (Moore and Connell 1960).

Hydatigera taeniaformis, a common cestode of cats, was found in 10 percent of all cats examined. This tapeworm has been reported in four to 21 percent (mean, 11.7 percent) of cats from three surveys conducted in the United States (Ash 1962, Mann and Fratta 1952, and Mann 1955). Our study suggests that *H. taeniaformis* is a relatively common parasite of cats in this region, and that the prevalence is comparable to the mean presented from three past studies. Cats become infected by ingesting the liver of intermediate hosts such as rats, mice, and, occasionally, rabbits, which contain the strobilocercus larvae (Soulsby 1965).

We have noted that muskrats (*Ondatra zibethica*) in Utah Valley also harbor these larval stages. Upon ingestion of the cysticeroid by the cat, the larvae evaginate and develop to adults in the small intestine. No apparent pathogenicity is caused by this parasite in the definitive host; however, the intermediate hosts sometimes develop scar tissue and experience a slight loss of liver function (Abuladze 1964).

Taenia krabbei was the cestode most frequently collected from dogs during this study. The intermediate host for *T. krabbei* is deer in which the cysticeroid larvae localize in skeletal muscle, heart, and tongue (Abuladze 1964). Occasionally such larval infections are observed in meat from mule deer (*Odocoileus hemionus*) that is brought to our laboratory for parasite diagnosis at the time of the deer hunting season in this area. Small adult tapeworms (0.25-0.40 m in length) with no gravid proglottids were collected from dogs in November, which time coin-

cides with the end of the deer hunting season in most of Utah. Larger adults (0.75-1.50 m in length) with active proglottids separated from the strobila were collected in March. It is common practice in Utah to either discard unusable deer meat or to feed the less desirable pieces of meat to dogs. This may explain the high incidence of *T. krabbei* and the seasonal variation in the maturity of the cestodes collected.

Taenia pisiformis and *T. hydatigena* each occurred in four percent of the dogs examined. The intermediate host of *T. pisiformis* is the jackrabbit, in which the cysticeroid larvae localize in the mesenteric membranes and rarely in the lungs, muscles, or brain (Abuladze 1964). In our study, *Taenia pisiformis* adults were found only in large hunting dogs that were capable of capturing rabbits. Deer and sheep serve as intermediate hosts for *T. hydatigena*, in which the cysticeroid larvae are found in the liver and mesenteric membranes (Abuladze 1964). Sheep farming is conducted in the immediate area around the communities surveyed, and many sheep are not disposed of properly or promptly after death. Thus, there is ample opportunity for stray or roving dogs to become infected after eating viscera of the intermediate hosts. Grundmann (1976) also found the larval stages of *T. hydatigena* in Utah in jackrabbits (*Lepus californicus*), the antelope ground squirrel (*Ammospermophilus leucurus*), voles (*Microtus* sp.), and the mule deer (*Odocoileus hemionus*).

No *Echinococcus granulosus* tapeworms were identified in any of the dogs surveyed in this particular study; however, one of 21 sheep dogs from Utah Valley examined in 1971 for another project was infected with this parasite (Andersen, Wright, and Mortenson 1973). Hydatid disease is considered endemic in parts of central Utah, especially in Sanpete County, and should be considered a potential threat to humans throughout Utah Valley as well. No *Multiceps* sp. were recovered from any of the dogs examined in this study; however, we have recovered the larval stages of this tapeworm from jackrabbits (*Lepus californicus*) in Utah Valley, and have also noted the adult tapeworms from dogs examined in conjunction with other projects. Since the larval stages can accidentally infect humans and can

on occasion cause death (Hermos et al. 1970), this parasite should also be considered to be of public health significance in this region.

Prevention of parasitic infections in cats and dogs is a matter of proper hygiene based upon knowledge of the development and life cycle of individual parasites. A concerted effort to dispose of pet excreta and periodically to treat household pets for parasites is needed in order to prevent human contraction of animal parasites. Education of the public regarding the ease of transmission of certain important parasites of cats and dogs to man and a continual emphasis on prevention and treatment will bring about a reduction in the incidence of parasites of household pets in this region.

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REFERENCES CITED

- ABULADZE, K. I. 1964. Taeniata of animals and man and diseases caused by them. Vol. 4, Essentials of cestodology, K. I. Skrjabin (ed.), Acad. Sci. USSR. (Transl. from Russian by Isr. Prog. Sci. Transl., Keter Press, Jerusalem, 1970.) 549 pp.
- ANDERSEN, F. L., P. D. WRIGHT, AND C. MORTENSON. 1973. Prevalence of *Echinococcus granulosis* infection in dogs and sheep in central Utah. J. Amer. Vet. Med. Assoc. 163: 1168-1171.
- ASH, L. R. 1962. Helminth parasites of dogs and cats of Hawaii. J. Parasitol. 48:65-68.
- BEAVER, P. C. 1958. Animal parasites and human diseases. Pediatrics 22:380-384.
- BEAVER, P. C., C. H. SNYDER, G. M. CARRERA, J. H. DENT, AND J. W. LAFFERTY. 1952. Chronic eosinophilia due to visceral larva migrans. Pediatrics 9:7-19.
- BUTLER, J. M., AND A. W. GRUNDMANN. 1951. Fecal examination of 200 dogs from Salt Lake City for intestinal helminths. J. Amer. Vet. Med. Assoc. 118:396-398.
- GRUNDMANN, A. W. 1976. Personal communication. Dept. of Biology, University of Utah, Salt Lake City, Utah 84112.
- HADDOW, J. E., AND D. G. GALL. 1970. Occult helminth infection with appearance of splenic and lung calcifications. Amer. J. Dis. Child. 120:555-556.
- HERMOS, J. A., G. R. HEALY, M. G. SCHULTZ, J. BARLOW, AND W. G. CHURCH. 1970. Fatal human cerebral coenurosis, J. Amer. Med. Assoc. 213:1461-1464.
- KNOTT, J. I. 1939. Method of making microfilarial surveys in dog blood. Trans. Roy. Soc. Trop. Med. Hyg. 33:191-196.
- LEE, H. F., AND T. J. DANARAJ. 1972. Visceral larva migrans in Malaya. Amer. J. Trop. Med. Hyg. 21:174-177.
- LEVINE, N. D. 1968. Nematode parasites of domestic animals and man. Burgess Publishing Co., Minneapolis. 600 pp.
- . 1973. Protozoan parasites of domestic animals and man. Burgess Publishing Co., Minneapolis. 406 pp.
- MANN, P. H. 1955. Additional information pertaining to the incidence of heartworms and intestinal helminths in stray cats and dogs in Bergen County, northern New Jersey. J. Parasitol. 41:636.
- MANN, P. H., AND I. FRATTA. 1952. The incidence of coccidia, heartworm, and intestinal helminths in dogs and cats in northern New Jersey. J. Parasitol. 38:496-497.
- MOORE, D., AND F. CONNELL. 1960. Additional records of *Dipylidium caninum* infections in children in the United States, with observations on treatment. Amer. J. Trop. Med. Hyg. 9:604-605.
- SOULSBY, E. J. L. 1965. Textbook of veterinary clinical parasitology. F. A. Davis Co., Philadelphia. 1120 pp.
- . 1968. Helminths, arthropods, and protozoa of domesticated animals. Bailliere, Tindall, and Cassall, London. 835 pp.
- SWARTZWELDER, J. C. 1941. *Toxocara cati* (cat ascarid) infection in man. Report of an additional case. J. Trop. Med. Hyg. 20:61-63.